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ABSTRACT

Originally designed for gifted students, these reproducible volcanology units emphasize the use of higher order thinking skills and are appropriate for use in any classroom. Interdisciplinary in content, the units provide a broad view of volcanology. Included are two complete units, one created for the upper elementary gifted student and the other for the lower elementary gifted student. Suggestions for adapting the materials to fit other classrooms are included. Several learning modalities are designed into the materials to encourage active student participation. (CW)

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VOLCANOLOGY

A SELF-DIRECTED LEARNING EXPERIENCE
Interdisciplinary – Product Oriented
Grades K – 8

SE 051 160

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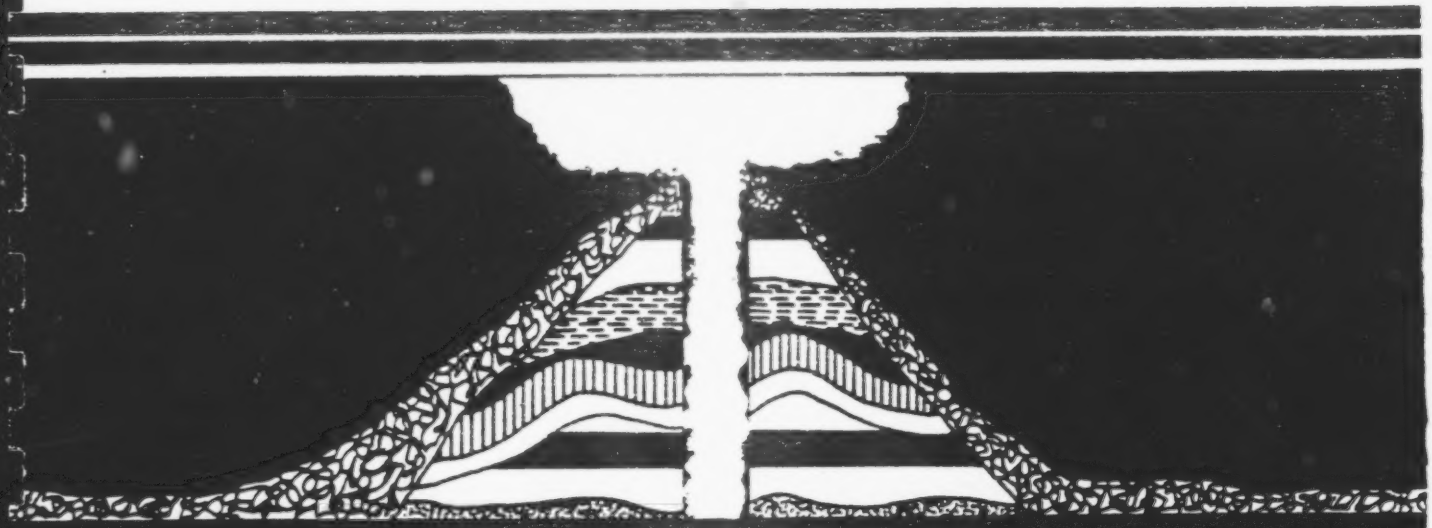

VOLCANOLOGY

A self-directed study promoting THINKING ABILITIES and using RESEARCH SKILLS as the student enters the world of volcanology.

Reproducible Units Grades K–3 and 4–8

VOLCANOLOGY:

Self-Directed Study Units for grades K-3 and 4-8, gifted

easily adapted for regular classroom use

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VOLCANOLOGY:

by Bonnie Rassmusen

Self-Directed Study Units for grades K-3 and 4-8, gifted

easily adapted for regular classroom use

Interdisciplinary and
Product Oriented
through the use of:

- Evaluating
- Classifying
- Comparing
- Imagining
- Researching
- Mapping & Charting
- Creating
- Reporting
- Thinking...Reacting
- Career Exploration

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CONTENTS

The Premise vii

A Word to the Teacher ix

1. Rationale for Self-Directed Learning 1
2. The Format 4
3. Suggested Readings 5
4. The Interest Development Center 7
5. Getting Started 9
6. The Unit: **VOLCANOLOGY**

UNIT I: KINDERGARTEN THROUGH THIRD GRADES. 11

SUGGESTIONS FOR ADAPTING THE UNIT 41

UNIT II: GRADES FOUR THROUGH EIGHT 43

BIBLIOGRAPHY 71

7. Exploring The Arts 75

THE PREMISE

CHILDREN ARE ACTIVE PARTICIPANTS IN THEIR LEARNING, NOT PASSIVE VESSELS TO BE FILLED. THEY ARE ALWAYS SEEKING AND CHOOSING WHAT THEY WILL LEARN AND WHAT THEY WILL NOT LEARN. THEIR ACTIVE INVOLVEMENT IS CRUCIAL TO LEARNING. CHILDREN TEND TO BECOME PERSONALLY INVOLVED IN PROJECTS THAT APPEAL TO A VARIETY OF MODALITIES . . . READING, WRITING, BUILDING, CREATING, IMAGINING, AND REAL THINKING . . . SO A VARIETY OF EACH IS INCLUDED IN THIS SELF—DIRECTED LEARNING UNIT.

A WORD TO THE TEACHER

VOLCANOLOGY

The Volcano . . . a source of mystery, fear and curiosity throughout the ages . . . once, maidens were sacrificed to quiet the "angry" mountains. Now, the seismograph records the rumblings of the earth . . . and man is still at the mercy of this devastating response to the forces of nature.

In 1500 B.C., a mountain on Thera, an island in the midst of the Aegean Sea, exploded. It destroyed a beautiful and civilized city and left only pieces of the original island. Mount Vesuvius provided fertile land on its slopes for six hundred years for the prosperous people of Pompeii. In 179 A.D., with some gentle warnings, the mountain erupted, killing perhaps 20,000 people. Vesuvius still rumbles. In 1631, once again, it erupted. This time about 4,000 more people were killed. Mount Etna, on the island of Sicily, has erupted many times. An estimated one million people have been killed by eruptions of this volcano. Mount Krakatoa, on a small island in Indonesia, erupted in 1680, then lay dormant until 1883. Krakatoa exploded with a force greater than any known before in history. Debris fell over an area of 300,000 square miles. Thirty-six thousand people were killed. The sea responded to the vibration of the explosion and tsunami destroyed villages in Sumatra and Java with waves 120 feet high.

More recently, attention has been turned to Mount Saint Helens, in the state of Washington. Between the years of 1831 and 1854, the mountain had been quite active. For the next 125 years, it was noted only for its snow-covered beauty. Suddenly, on March 20, 1980, Mount Saint Helens began to rumble. Volcanologists, with their instruments, rushed to the site to study, measure and speculate. The speculation was that it was ready to "blow". Eight weeks later, it did. The force was greater than that of the first atom bomb. The sound was heard for 200 miles. Ash and dust particles were found as far away as 500 miles. In the months since the eruption, Mount Saint Helens continues its activity . . . sometimes gently . . . other times with more vigor.

What is the value of the study of the volcano? Can man really learn to "read" and interpret the messages the earth is giving? Perhaps a greater question might be . . . *will* man listen and respond to the message?

"ONE CAN LEARN THE CAMPAIGNS OF THE CIVIL WAR WITH DATES, BATTLES AND CHARACTERS WITHOUT LEARNING ANYTHING ABOUT WHY WARS ARE FOUGHT BETWEEN FRIENDS OR WHAT IDEAS CAN BE GENERALIZED TO OTHER CONFLICT SITUATIONS."

James Gallagher,
Teaching the Gifted Child, 1974

RATIONALE FOR SELF-DIRECTED LEARNING

Our children's education must be more than the memorization of capitols of the states, the products of countries and the dates and places of past wars. Most teachers and parents would agree that what is also wanted is for children to learn to think for themselves, to organize their own time, to make wise choices, to work independently and to thoughtfully evaluate the results of their study.

OBSTACLES TO INDEPENDENT LEARNING

In spite of the teacher's best efforts, many, if not most, classroom settings are organized in such a way that students are involved in schedules and organizational plans that foster dependence rather than the independence we prefer. Students are told what is to be learned, how long it will take them to learn it, the resources are defined by the teacher and, afterwards, the teacher rather than the student decides whether the learning experience was a satisfactory and valuable one.

A LEARNING ATMOSPHERE

Each time we, as educators, focus on what our objectives are, we need to take a fresh look at our classroom mode of operation and evaluate the effectiveness of the way we teach. Quite naturally, for most of us, our teaching style has more to do with how we were taught than with what recent research has shown about the learning process. Even our good instincts have been overcome by the years of conditioning we have known in our own educational experiences.

Like a breath of fresh air, the recent findings coming from the research on the brain and how it operates are supporting our intuitive knowledge. This research is showing that our brains are receptive to learning only under certain conditions. Our job is to translate that information into a classroom atmosphere that provides:

- challenge
- freedom within structure
- trust and warmth
- opportunities to experience success
- personal involvement in the curricula

A natural transition generally occurs that transforms the former "teacher-lecturer" into a "fellow-learner". As a "fellow-learner" the teacher's role becomes one of a resource person, a facilitator and a classroom manager. In this maturing atmosphere, students gradually come to see themselves as responsible for their own learning and a foundation for self-direction is set.

* * *

At this point, a sometimes unexpected problem arises. We find the student no more ready for their independent learning than we, as teachers, were ready to allow it. This common occurrence is mentioned repeatedly in the literature dealing with programming for the gifted, an area where independent study and research are recommended as a major curricular activity (see **Suggested Reading List**; Maker (1982), Doherty & Evans (1980), and Feldhusen and Treffinger (1980).

FROM PASSIVE LEARNER TO ACTIVE PARTICIPANT (BRIDGING THE GAP)

The **ZEPHYR** self-directed study unit was developed expressly to bridge that gap . . . to transport the student from the position of passive recipient to that of an active participant in his/her own pursuit of knowledge.

Within the defined structure of each unit, the students are given opportunities to:

- make choices
- learn at their own pace
- learn in a manner more closely suited to their own learning style
- expand research skills
- use a variety of modalities
- plan their own time
- develop the skills of creative, critical and evaluative thinking
- experience whole-brain learning

Since responsibility for directing their own learning is so often an unfamiliar situation, the students will need your encouragement at the start. Generally, within six to nine weeks, most students will be well on their way from teacher dependence to self-motivation. (Beginning the venture with only a few choices, then gradually arranging the setting so that there are more and more choices, works best.) As students assume more responsibility, many teachers begin to consider the school library as just another part of the classroom . . . the benefits are many . . . from gaining a personal relationship with the librarian to learning about the enormous resources available, but often unused, in most school libraries.

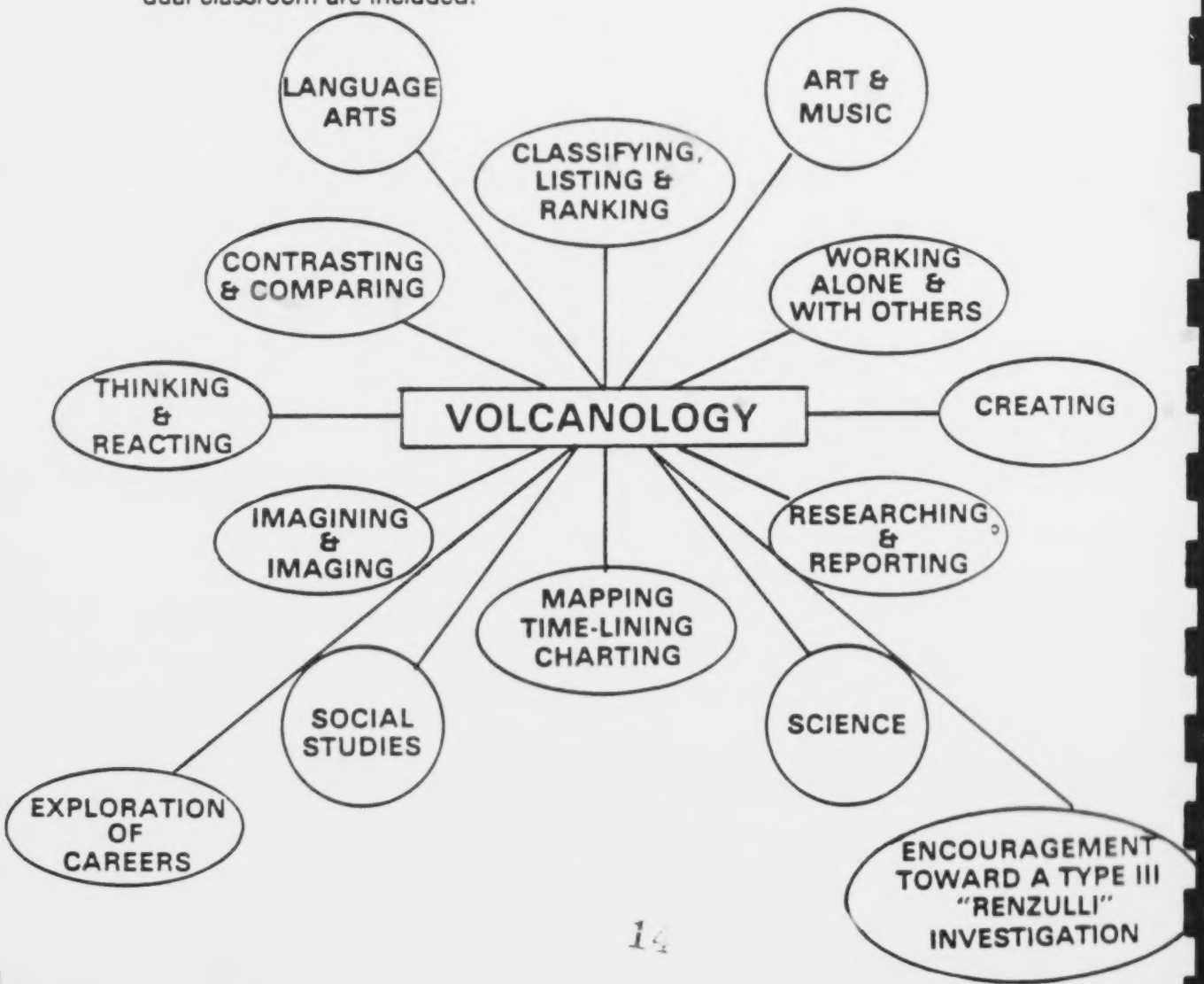
Eventually, a few students will be ready for a true investigative research study of professional quality as suggested by Joseph Renzulli in **The Enrichment Triad Model, A Guide for Developing Programs for the Gifted and Talented**, 1977.

THE FORMAT

Originally developed for the gifted student, these units emphasize the use of the higher level thinking skills . . . and are appropriate for use in any classroom where the goal is to encourage students to become responsible for their own education.

Interdisciplinary in content, the unit envelopes a broad view of the topic by integrating the "basics" into each activity.

Within this book are two complete units, one created for the upper elementary gifted student and the other for the lower elementary gifted student. Suggestions for adaptations for adjusting either of the levels to fit any individual classroom are included.



SUGGESTED READINGS

SELF-DIRECTED STUDY

"Bells, Groups and Independent Study", **Psychology and Education of the Gifted**. Barbe, W. and Renzulli, J. New York, 1975. Irvington Publishers.

Creative Questioning and Sensitive Listening Techniques. Carin, A. and Sund, R. Columbus, Ohio, 1978. Charles Merrill Publishing Company.

Creative Thinking and Problem Solving in Gifted Education. Feldhusen and Treffinger. Dubuque, Iowa, 1980. Kendall-Hunt Publishing.

Curriculum Development for the Gifted. Maker, C.J. Rockville, Maryland, 1982. Aspen Systems Corporation.

Enrichment Triad Model: A Guide for Developing Defensible Programs for the Gifted and Talented. Renzulli, J. Mansfield, Connecticut, 1977. Creative Learning Press.

Growing Up Gifted. Clark, B. Columbus, Ohio, 1978. Charles Merrill Publishing Company.

Inviting School Success, A Self Concept Approach to Teaching and Learning. Purkey, W.W.. Belmont, California, 1978. Wadsworth Publishing Company, Inc.

Open to Change: Options for Teaching Self-Directed Learners. Malehorn, H. Palo Alto, California, 1978. Scott Foresman Company.

Self Starter Kit for Independent Learning. Doherty and Evans. Austin, Texas, 1980. Special Education Associates.

Teaching the Gifted Child. Gallagher, J. Boston, Massachusetts, 1975. Allyn and Bacon.

INTEREST DEVELOPMENT CENTER

VOLCANOLOGY

THE PURPOSE OF THE INTEREST DEVELOPMENT CENTER IS TO STIMULATE INTEREST IN THE TOPIC AREA. THE STUDENT NEEDS TIME FOR BROWSING AND INVESTIGATION FOR MAXIMUM BENEFIT.

(Beginning ideas . . . . . you and your students will think of more . . . . . let parents and other teachers know about the Center and it will many times grow without effort.)

BOOKS, FILMSTRIPS, POSTERS, SLIDES ABOUT:

- VOLCANOES
- VOLCANOLOGISTS
- TOOLS OF THE VOLCANOLOGIST
- MYTHS AND LEGENDS ABOUT VOLCANOES
- VOLCNIC ACTIVITY ON OTHER PLANETS
- ART AND EXCAVATION OF UNCOVERED CITIES
- THE CIRCLE OF FIRE
- LAVA FLOWS
- GEYSERS
- GEOLOGY
- ARCHAEOLOGY
- PALEONTOLOGY
- EARTHQUAKES
- PLANETARY ALIGNMENT
- SAN ANDREAS FAULT
- WEATHER
- TSUNAMI
- EARTH FAULTS

RECORDINGS OF VOLCANIC ERUPTIONS
MAPS, GLOBES
PHOTOGRAPHS
GRAPHS SHOWING SEISMOGRAPH READINGS
MOUNT SAINT HELENS REPORTS

- Newspaper Clippings
- Magazine Articles
- Letters Telling of Personal Experiences
- Forest Service Information

VOLCANIC ROCK
VOLCANIC ASH
EXAMPLES OF POTTERY USING VOLCANIC ASH
SOUVENIRS OF MOUNT SAINT HELENS

- T-Shirts
- Calendars
- Posters
- Bumper Stickers

JOURNALS
NATIONAL GEOGRAPHIC MAGAZINE
EARLY MAN
SCIENCE '80, '81, '82, '83, etc.

MATERIALS, BOOKLETS, FLYERS FROM NATURAL HISTORY MUSEUMS

I HEAR ..... AND I FORGET
I SEE ..... AND I REMEMBER
I DO ..... AND I UNDERSTAND
(source unknown)

GETTING STARTED

Select a topic as an extension of a regular curricular subject (particularly when your class seems to crave more) . . . or . . . select a topic to pursue that is of particular interest and may not be part of the curricula. To **zero in on special interests,** administer an interest survey to each student.

2. **Copy the unit for each student.** When using these units for the entire class you may want to expand or delete activities for individual students.

3. **Set up a center** in the classroom **that encourages exploration** in the subject field. You'll want to in-include a wide variety of materials. **Be creative,** the purpose of the center is to **excite the student in this subject area** so begin with **lots of "hands on" materials . . . . allow for ample browsing time** and **encourage the student to investigate** and become absorbed . . . . **at the level of a true professional.**

With the students, **go over each activity** in the unit, discussing and answering any questions. The **teacher is an integral key** in successful implementation. Because most children are already well-versed in the **"One Right Answer Game"**, they will need encouragement to branch out into many of the open-ended activities in the packets.

5. Set the stage . . . plan to conference as needed . . . . provide resources as needed . . . . then get out of the way and let your students learn.

6. Give as much time as each student needs to complete each activity in the unit. The entire packet might take from five to ten weeks or longer.

7. As each activity is completed and evaluated, initial the symbol located near each activity number. You will want to evaluate on the basis of what response is appropriate for that student.

8. When a student shows an extreme interest in the topic, the completion of this unit might be only the beginning. This student may well be ready for further study and research and needs only the resources, guidance and freedom to pursue his/her well-planned project.

In preparation for further research, the student will need to decide:

WHAT WILL THE STUDY BE? (what will be investigated and produced)

WHERE WILL BACKGROUND INFORMATION BE FOUND? (i.e., speakers, interviews, books, films, microfiche, documents, etc.)

WHAT, EXACTLY, WILL BE THE FORM OF THE PRODUCT? (a model, a manuscript, or . . .)

WHO MIGHT BE INTERESTED IN THE PRODUCT? (professionals in the field, publishers, organizations, etc.)

WHAT IS NEEDED TO BEGIN? (specific plans, resources, deadlines . .)

AGAIN . . . STEP BACK . . . PROVIDE GUIDANCE . . .
and LET HIM/HER GO!

VOLCANOLOGY

UNIT I

NAME _____

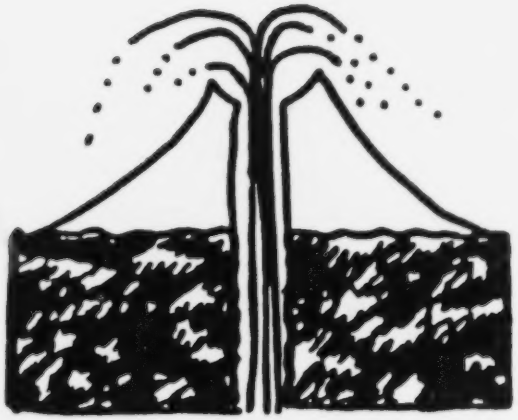
DATE _____

19

The following pages are to be reproduced for use in your classroom. You may want to copy directly from this book or cut the pages out first . . . then keep them in a folder to use another year.

20

FIND OUT ABOUT
VOLCANOES



Find some books about volcanoes that look interesting . . . .
Get about 5 books if you can.

Take some time to study the books. Look at the pictures carefully and read what you can.

Get help with words if you need help.

1. NOW YOU ARE READY TO BEGIN

There are volcanoes all over the world.

Find out the names of a famous volcano in each of these countries:

Japan _____

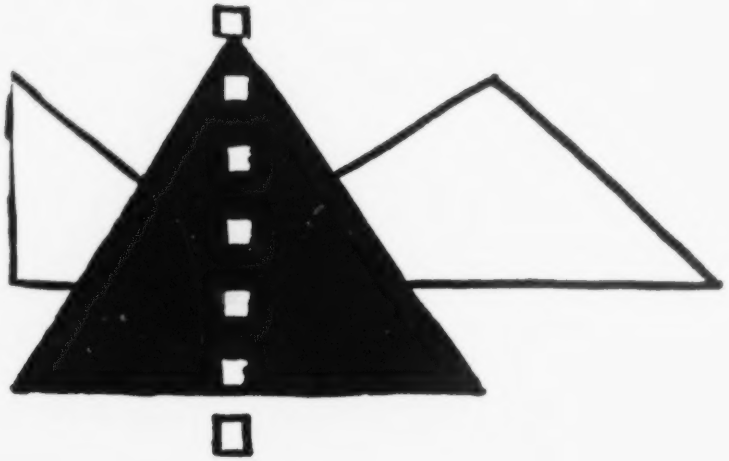
Italy _____

Hawaii _____

United States _____

Mexico _____

2. WHAT DO YOU KNOW ABOUT VOLCANOES . . . ?



Make a large picture of a volcano.

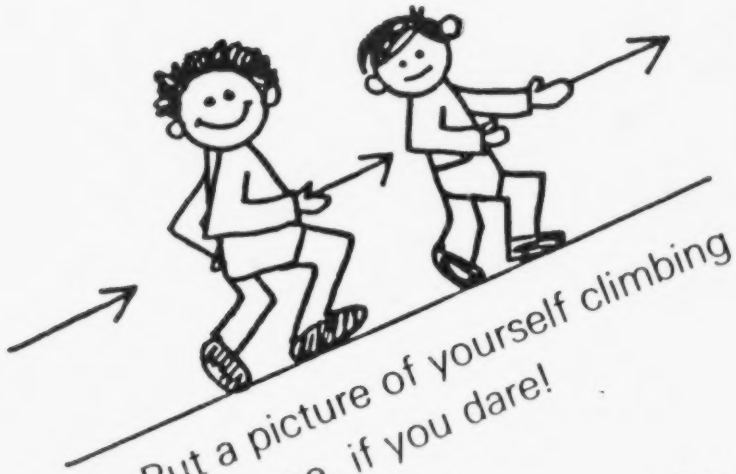
Label the parts.

Be sure to include these:

- The **cone**
- The **crater**
- The **lava flows**

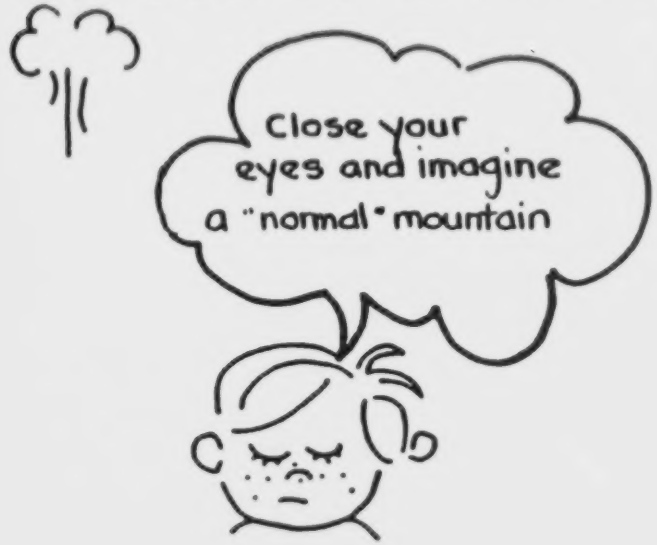
Is there a **caldera** on your volcano?

Is your volcano **active**?
Do what you can to show that in your picture.



Put a picture of yourself climbing the slope, if you dare!

3. HOW DID IT HAPPEN?



How is a "normal" mountain formed?

_____

_____

_____

What words describe a "normal" mountain?

_____ _____

_____ _____

_____ _____

How is a "volcanic" mountain formed?

_____

_____

_____

What words describe a "volcanic" mountain?

_____ _____

_____ _____

_____ _____

4. IS IT ALIVE?

Find out the differences in these volcanoes.

Active volcano _____

Extinct volcano _____

Dormant volcano _____

If you are going for a hike . . .
Which would you prefer to hike?

Active ☐
Extinct ☐
Dormant ☐

5. MYTHS

Find out about a famous legend related to a volcano.

Rewrite it in your own words.

Make a book with your illustrations.

(You might want to get someone to read this to you . . .)

6. WORDS

Fill in the missing letters in this **VOLCANO** crossword puzzle.

```
R
O  L
__RATE__
K  __
    A__HES
```

See if you can make up one of your own.

7. HAVE FUN — CREATE

— Choose One —

Make a flip-book showing a volcanic eruption.

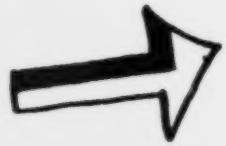
Make a collage of magazine or newspaper pictures and words about volcanoes.

Make a mobile showing things related to volcanic activity . . . for instance . . .
lava . . . **caldera** . . . **ash** . . .
fire . . . **smoke** . . . .

(You can find more in your books about volcanoes.)

8. JUST IMAGINE . . .

Pretend that you are an animal . . . peacefully going about your daily life as most animals do.



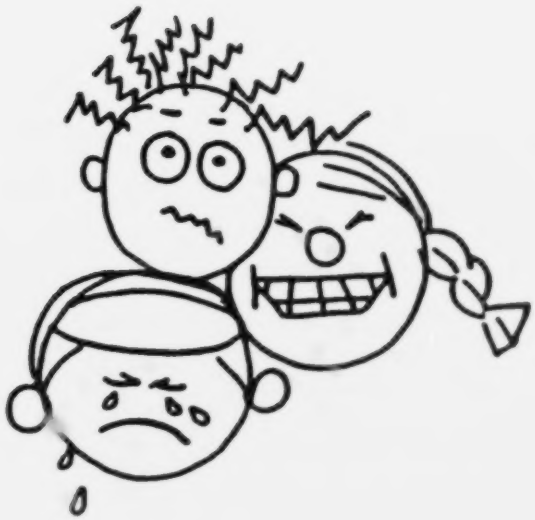
Lately, there has been something very peculiar about this mountain. The ground seems to be warmer every day. And, sometimes you feel a shaking of the earth. Once you thought there was a sound from inside the mountain.

You live near the top of a beautiful mountain. This mountain is steep and it looks just like most mountains except that the top seems to have lost its point. The sloping top is the playground for the animals that live on the mountain.

SUDDENLY the earth begins vibrating so much you almost fall. Then something white and steamy like a stream of hot, damp air begins shooting out of a crack in the mountain.

(turn the page)

NOW everything is rumbling and shaking. Rocks are falling. Worst of all, something so hot it looks like fire is oozing out of the mountain and pouring down the mountain toward **YOU!**



DECIDE

What animal you are. _____

Something about yourself:

Are you shy, brave, curious, strong, daring (Think of lots of words to describe yourself).

_____

_____

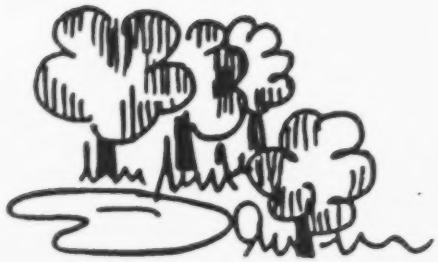
_____

_____

_____

(turn the page)

Think of what the mountain looks like before the rumbling begins . . . Is it covered with trees? . . . Is there water on the mountain? . . . Who lives there besides you? . . . Do humans ever come there? **Think** of everything you can.



How did you feel at the beginning of this eventful day? What changes are there as the day goes on?

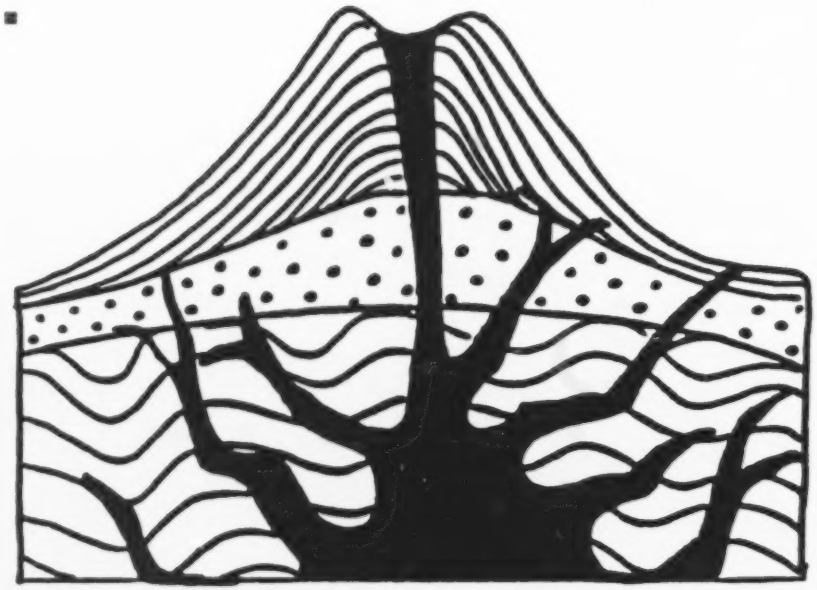
MAKE UP a story called **"THE GREAT ESCAPE"**.
Tell about this exciting time in your life. Be sure to tell what you are thinking as you notice what is happening on the mountain. Make a tape of your story . . . don't forget to add sounds.

9. LEARN MORE . . .
HAVE FUN

— Choose One —

Find out about "Cosmic Volcanism" . . . Write a story about a trip to the moon and your discovery of a volcano there.

Make a model of a volcano . . . use clay or papier mache.
Which type is it? . . .
Cinder cone volcano . .
strato-volcano . . . or
shield volcano?



Make a chart of the most famous volcanoes. Be sure to label them.

10. ANOTHER WAY TO LEARN

Invite someone to talk to your class about volcanoes. (A geologist would be able to answer lots of questions.)

Be sure to ask about
"continental drift" and **"plate tectonics"**.

See if you and your friends may set up a center in your class, first.

In your center put everything you can find about volcanoes.

- Filmstrips
- Pictures
- Models of volcanoes
- Volcanic rock
- _____
- _____
- _____

Leave this up for a few weeks so that everyone can learn about volcanoes.

KEY

(Activity 6. WORDS)

R
O L
CRATER
K V
ASHES

SUGGESTIONS FOR ADAPTING THE UNIT TO YOUR PARTICULAR TEACHING-LEARNING SITUATION

1. Require fewer, or more, research sources.

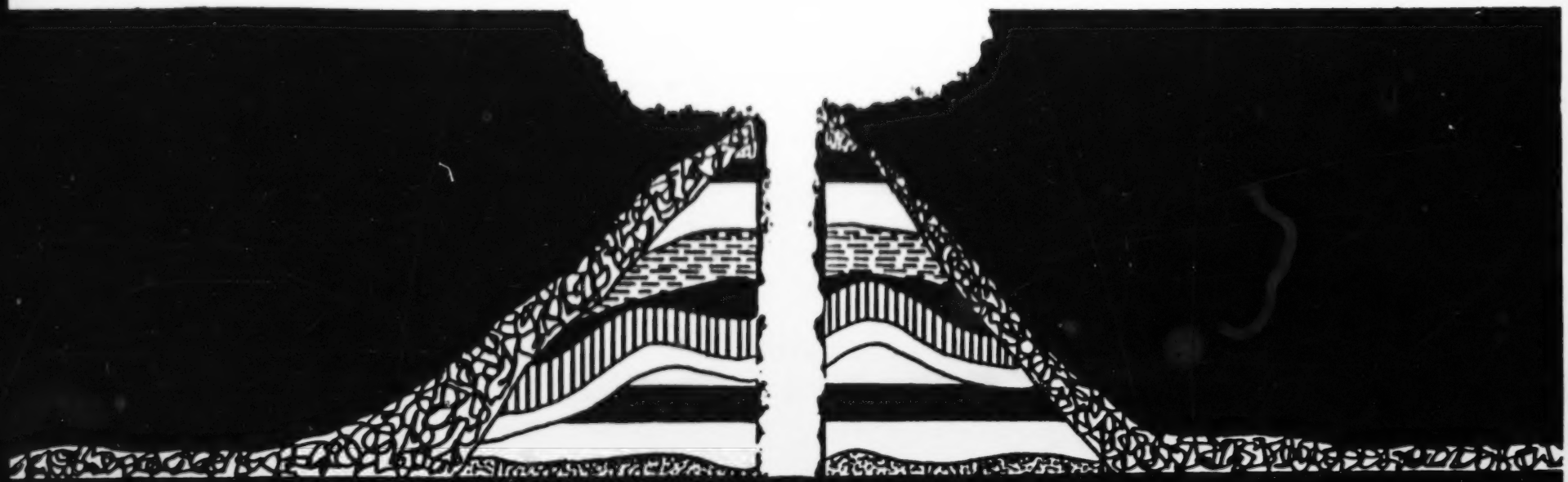
2. Assign more of the activities to small groups instead of to individual students.

3. Give fewer or more choices.

4. Delete some activities altogether.

5. Arrange the unit to be a class project with students choosing different parts to complete.

6. Add some activities of your own.



VOLCANOLOGY

UNIT II

NAME _____

DATE _____

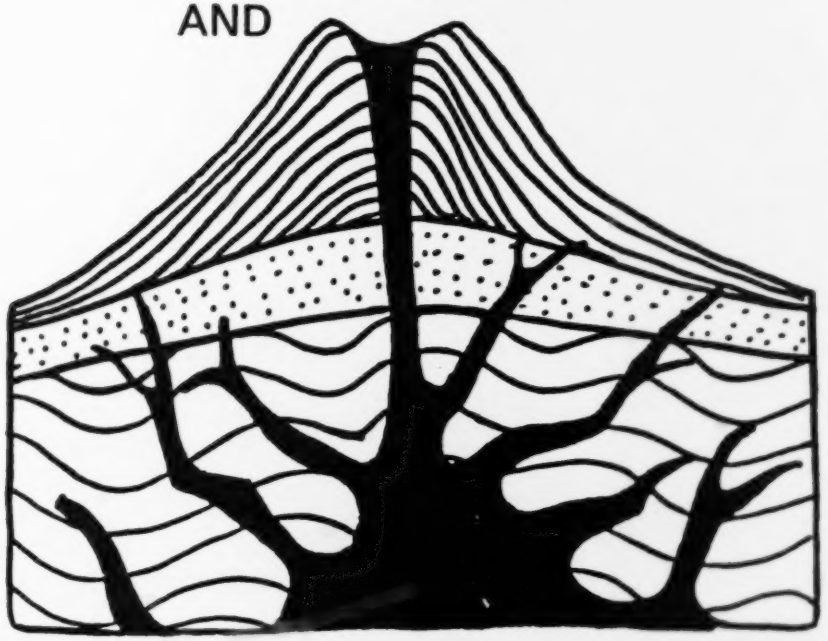
The following pages are to be reproduced for use in your classroom. You may want to copy directly from this book or cut the pages out first . . . then keep them in a folder to use another year.

1. FIND OUT ABOUT

CONSIDER the various hypotheses concerning the formation of the solar systems . . . then consider:

- The causes of internal heat and the magnetic field of the planet Earth.
- The cause of the Earth's magnetic field fluctuation.
- How possible it is that the Earth has a cold center.
- What implications any of the above might have on volcanic activity.

AND



CONSIDER the relationship of plate tectonics to volcanic distribution.
THEN compare continental drift to plate tectonics and learn about the hot-spot theory.
Think about the role of computers in further study of earth changes.

Write a scholarly discussion of either of the above. Present what is known and hypothesized and present your view.
Cite your references.

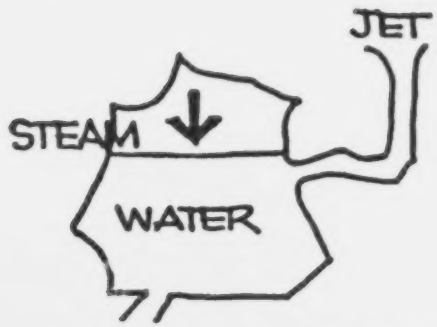
2. MYTHS, ETC. . . .

Research legends, myths, famous quotes, novels, poetry, etc. about or referring to volcanoes.

Prepare a booklet using as many sources as possible. Bind it and present it to the place or person of your choice . . . the library, a relative, yourself, or . . .
(Be sure to note the source of each item used.)

3. WHAT DO YOU KNOW ABOUT VOLCANOES . . . ?

— Choose One —



How do eruptions affect our climate? Research this subject and write or give an oral report relating your findings.

Draw a picture to illustrate what happens when a cinder cone is formed.

Contact a geologist or geophysicist to find out what the possibilities are for a volcanic eruption in your state.

Make a chart listing types of pyroclastic materials and describe how each type was formed.

Find out about related types of volcanic activity. Share your findings in a way of your choice.

List and illustrate on a poster as many types of volcanic rocks and minerals as you can discover. Hang your poster in the classroom.

Select one existing volcano (active, dormant or extinct) which you would choose to be the most perfect example of its type. Justify your choice by illustrations, a model and/or a written report.

4. WHAT ELSE DO YOU KNOW? . . .

(Choose One More)

Make a mural entitled **"The Volcano Hall of Fame"**.
Identify, describe and illustrate each volcano you choose to include.

Read to find out about the **"Ring of Fire"**.
Draw a map to illustrate it, then display it in some way.

Develop a chart to **compare and contrast** the volcanic eruptions
of Mount St. Helens and Mt. Vesuvius.

Find out the dates of eruptions of the most famous volcanoes.
With a long strip of paper, make a time line showing these dates.

5. JUST IMAGINE . . . — CHOOSE TWO —

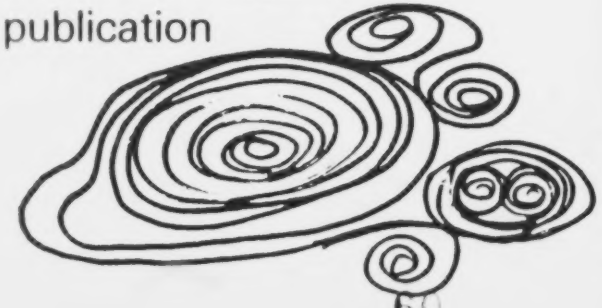
Pretend you are the mayor of an eastern Oregon city. Write and tape record a speech about preparedness for the possible effects of an eruption of Mt. Hood.

Make believe that you are a prehistoric person who has just observed a volcanic eruption. Write a myth based on what you see, hear, smell and feel to explain this phenomenon.

Imagine that you are a newscaster covering the eruption of a volcano. You could be in a helicopter, jeep or whatever you decide. Interview some nearby residents if you can . . . give background information on the site and give a moment-by-moment description. Tape it (with SOUND EFFECTS!).

Imagine that all the volcanoes of the world have erupted and life on earth (as we know it) is threatened with extinction. You are in charge of a 4'x4' "culture capsule" which may be found by future or extraterrestrial life forms and analyzed. What would you put inside to reflect Earth's various cultures, our history, our present predicament? Where would you put it to protect it and facilitate its discovery after many years? Write a fictional report about what you would do.

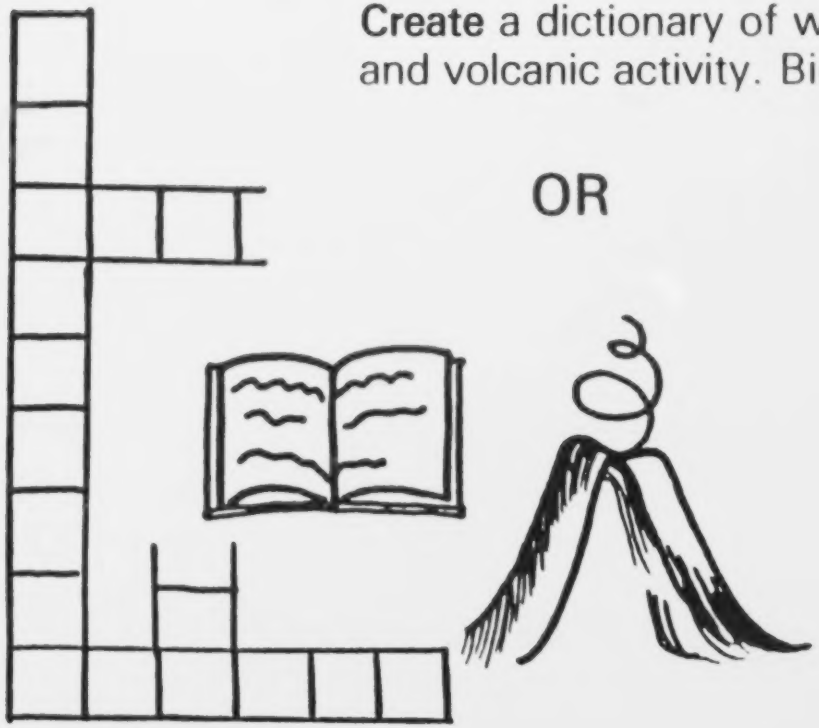
Write a poem about volcanoes. Submit it to the school paper or your favorite magazine for publication



6. WORDS-WORDS-WORDS

List as many words as you can that describe an active volcano — then list as many as you can that describe an *inactive* one. (Use your imagination!)

OR



Create a dictionary of words and terms relating to volcanoes and volcanic activity. Bind it into a book.

OR

Make a word search or a crossword puzzle of volcanological terms. After you have done your rough draft, make copies for your classmates.

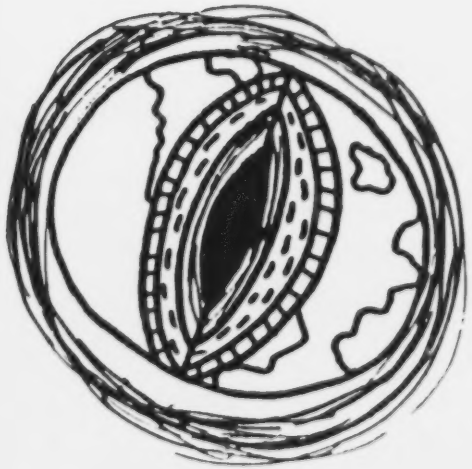
7. DELVE IN

CHOOSE ONE . . .

- **Learn** about a stratovolcano. Make a model of one, labeling each part. Write a few paragraphs describing how this volcano is formed.

- **Devise** a scientific experiment using volcanic ash or pumice and demonstrate it. Explain your results.

- **What** determines the amount of gas found in the lava of an erupting volcano? What is the result of the varying amounts of gas upon the structure and composition of the forming volcano? Share your findings in some way.



- **Investigate** "Cosmic Volcanism" . . . (volcanoes occuring on the moon or other planets.) Make a chart which will show similarities and differences between Earth's volcanoes and those on other planets.

- **Investigate** geothermal energy to find how it compares with other types of energy sources such as hydroelectric, nuclear, solar, etc. Evaluate their effectiveness. Devise a way to share what you find.

- **Make** a graph showing the relative energies released by some volcanoes.Look up the tables in ***Volcano,*** by Maurice and Katia Krafft for help.

8. HAVE FUN — CREATE

— Choose One —

- **Make** a replica of an item unearthed in Pompeii. Display it in the library or in a center.

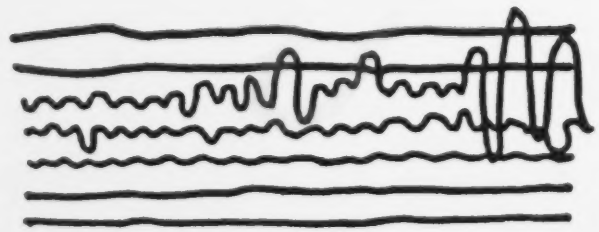
- **Make** a mobile showing some of the well-known volcanoes. Hang it in the classroom.

- **Prepare** a bulletin board showing a volcanic eruption and its effect on the surrounding environment.

- **Make** a flip-book showing a volcanic eruption. Put it where someone can enjoy it.

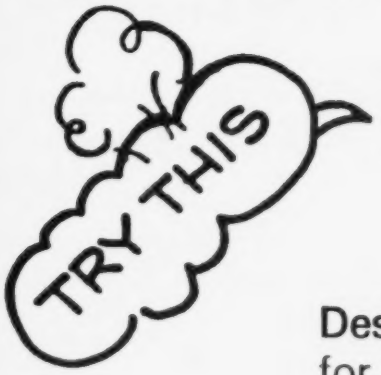
- **Make** a collage of newspapers and magazine articles and photographs about volcanoes and related volcanic activity.

- **Draw** a cartoon showing how people in your city might react to the formation of a volcano nearby. Remember – different types of people react differently!

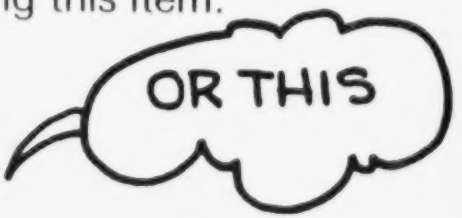


9. DEVELOP AN IDEA

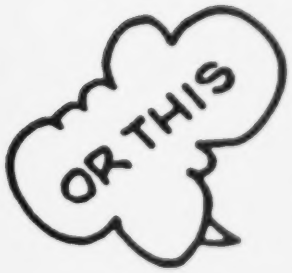
BY YOURSELF OR WITH OTHERS



Design a T-shirt or bumper sticker which will say something about volcanoes. Consider making plans for merchandising this item.



Design a vistors' center display about a volcanic site for the U.S. Parks Department. Illustrate and describe what you would include in your center. Tell why you chose that idea or item. Submit your idea to the Parks Department.



Imagine that you have just bought a train car-load of volcanic ash, cinder and pumice. Make a plan for advertising these materials for sale. Then put your advertising in final form. Display your work.

A volcano has just erupted and you were nearby. It ejected from its crater a shiny, cubic-shaped object. Write a story or a skit telling what this object is, how it came to be ejected from the volcano, and what happened after you found it.

10. SOMETHING FOR SOMEONE ELSE

Make a coloring book about volcanoes for younger children to use. Make your final copy on a duplicating master so it can be reproduced.

OR

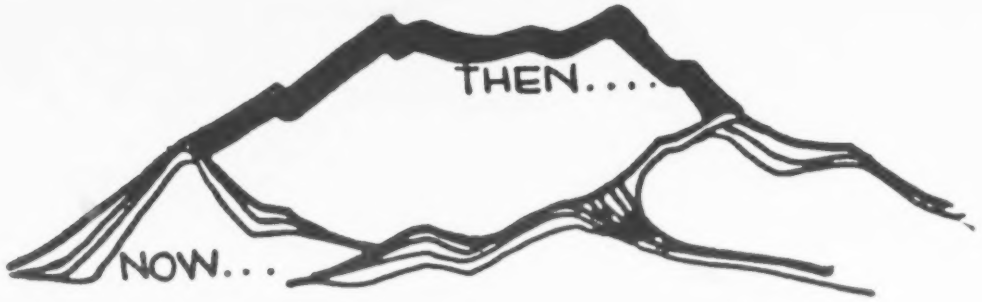
Create a gameboard to teach others about volcanoes. Give or loan it to another class.

OR

Think of something else . . . a way to teach others about volcanoes.

11. ANOTHER WAY TO LEARN

Invite someone to speak to your class about volcanoes. (If you have a college nearby, try the geology department.)



Interest your class in Volcanology. Several days before the speaker comes, you could:

- Show a film
- Give a pre-test
- Set up a learning center
- Put up a bulletin board
- _____

(your idea)

Have some questions ready to ask. For instance, "What do you believe about the 'plate tectonics theory'?" or "Is it possible that the center of the earth is not hot?"

12. READ . .

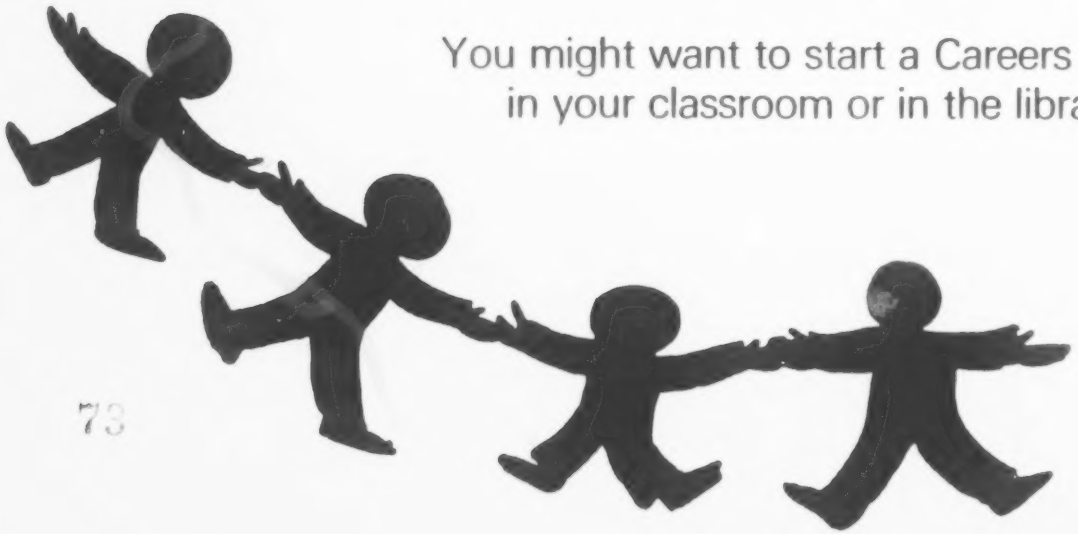
Read the fictional book, ***Volcano Adventure,*** by William Price which was published in 1956. Write a comparative review of this book based on scientific accuracy and techniques used then and now.

(If you can't locate this book, find another one or . . . .)

13. INVESTIGATE AND REPORT

ON POSSIBLE CAREERS for people who are interested in volcanic activity.

You might want to start a Careers Center in your classroom or in the library.



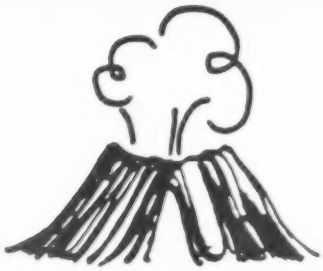
14. YOU WANT TO KNOW MORE?

Decide whether or not you would like to continue with your study of volcanoes as an in-depth independent study. If so, plan the areas you would like to investigate further, decide upon an intended product, and an intended audience for your project. Make a list of possible resources. Then, get started!

VOLCANOES

Adams, George and Wyckoff, Jerome	LANDFORMS
Adler, Irving and Ruth	THE EARTH'S CRUST
Ames, Gerald and Wyler, Rose	PLANET EARTH
Blanchard, Duncan C.	FROM RAINDROPS TO VOLCANOES: ADVENTURES WITH SEA SURFACE METEOROLOC
Bullard, Fred M.	VOLCANOES OF THE EARTH(Revised edition of volcanoes: In History, In Theory, In Eruption)
Calder, Nigel	THE RESTLESS EARTH
Coleman, Satis N.	VOLCANOES NEW AND OLD
The Columbian, Vancouver, Washington	MOUNT ST. HELENS DIARY: A Sunday Holocaust, Supplement to The Columbian
Francis, Peter	VOLCANOES
Furneaux, Rupert	KRAKATOA
Gribbin, John	THIS SHAKING EARTH
Harris, Stephen L.	FIRE AND ICE: The Cascade Volcanoes
Heintze, Carl	THE CIRCLE OF FIRE: The Great Chain of Volcanoes and Earth Faults
Irving, Robert, pseud. (Adler, Irving)	VOLCANOES AND EARTHQUAKES
Kaye, Glen	HAWAII VOLCANOES: The Story Behind the Scenery
Krafft, Maurice and Katia	VOLCANO
Ladyman, Phyllis	INSIDE THE EARTH
Lauber, Patricia	JUNIOR SCIENCE BOOK OF VOLCANOES
Matthews III, William H.	THE STORY OF VOLCANOES AND EARTHQUAKES
The Oregonian	MOUNT ST. HELENS: The Volcano
Orion Press	THE ORION BOOK OF VOLCANOES
Poole, Lynn and Gray	VOLCANOES IN ACTION: Science and Legend
Price, Willard	VOLCANO ADVENTURE
Pough, Frederick H.	ALL ABOUT VOLCANOES AND EARTHQUAKES
Rittman, A. and L.	VOLCANOES
Taxieff, Haroun	THE MAKING OF THE EARTH: Volcanoes and Continental Drift
Walworth, Ralph Franklin	SUBDUE THE EARTH

Films and Filmstrips



MP The Earth: Volcanoes - Coronet Instructional Films, 1969. 11 min. color, sound, teacher's guide. Summary: Points out that mud pots, geysers and thunderous eruptions are evidence of volcanic actions which result in cinder cones, crater lakes, lava domes, calderas and shield and strato-volcanoes.

MP Eruption of Vesuvius - Anargyros Film Library, 4 min., silent, b & w, 8 mm. A loop film mounted in cartridge. Summary: Captioned news films show the 1944 eruption of Mt. Vesuvius. The 1929 eruption and the destruction of Pompeii are also mentioned.

MP How Geysers Work - Film Associates, n.d., 2:45 min., silent, color, 8 mm. A loop film mounted in cartridge. Summary: The sequence of events leading to an eruption is shown in animation, followed by eruptions in live action.

MP Lava Flows - Film Associates, n.d., 3:30 min., silent, color, 8 mm. Loop film in cartridge. Summary: Two types of lava flow are seen in live action photography. Aa lava is thick and flows slowly, forming a crust on the surface. Pahoehoe lava is hotter and very fluid and runs downhill in streams.

FS Volcanic Landscapes - Staley Studio, 1972. 42 frames, color, 35 mm. and cassette with script. Summary: Describes volcanic activity, its effects on the landscape, and the land's recovery. Shows scenes of Sunset Crater and Lassen Peak.

FS A Volcano - Encyclopaedia Brittanica Educational Corp., 1977. Approx 101 frames, color, 35 mm. and cassette. Fieldstrips: Exploring earth science: Investigates the structure of Kilauea on the island of Hawaii and describes the methods employed by scientists at the Hawaiian Volcano Observatory in studying volcanoes.

FS Volcanoes (Kit) - Nat'l Geographic Soc - Washington: Nat'l Geographic, 1977 1 filmstrip, col, 35 mm. with audiocassette and script, quizzes, duplicating masters, study prints and teacher's guide. Summary: Helps improve reading skills, increase reading and listening comprehension and build vocabulary while teaching specific concepts. Discusses formation and shapes of volcanoes. Covers adverse and beneficial effects. (Primary and intermediate grades)

MP - Motion Picture FS - Filmstrip

Exploring The Arts

an opportunity to integrate art experiences within an academic content area.

by
Stephany Grassinger

While each component . . . the self-directed learning unit and Exploring the Arts . . . is a complete and valid learning experience in itself, together they provide a more comprehensive and lasting educational experience for the learner.

VOLCANOLOGY

Create a landscape depicting a volcanic eruption.

Think of the earth sliced into pieces like slices of bread.
How would the layers stack up on each other?
Select colors that express volcanic action.
Use shapes and lines that express the force of an eruption.
Visually express the concept of movement in your piece of art.

Use crayons or oil pastels.

Experiment and blend your colors. Use heavy pressure on your crayon to get a rich, even color.

Paint your picture with watercolor paint.

You will have made a **crayon resist.**

Interpret the same idea as your crayon resist using different materials.

Try working with torn, or cut, colored construction paper or just use lines to express your idea.

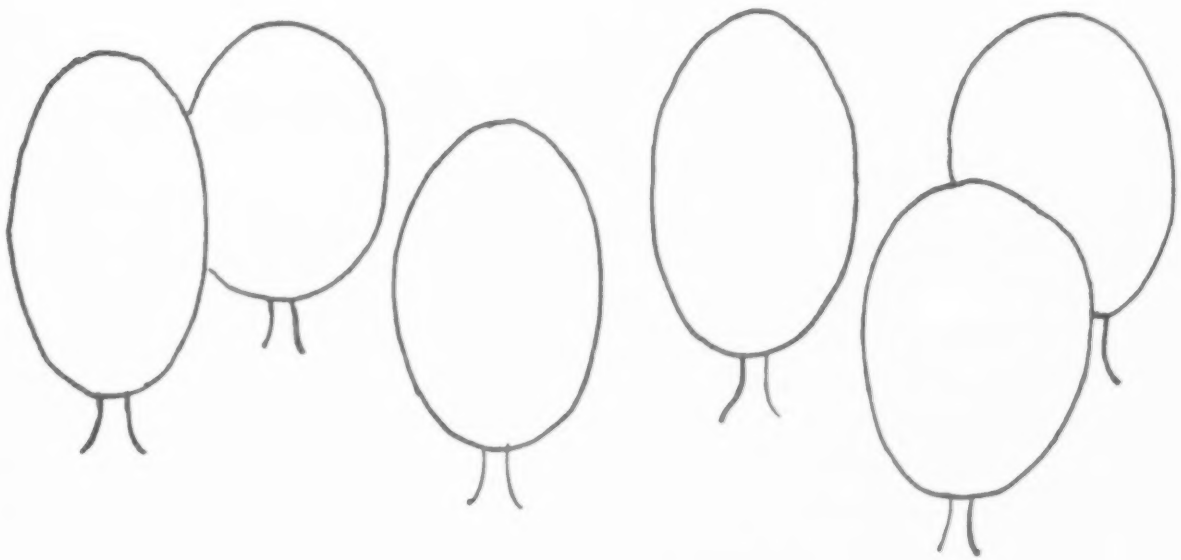
Compare the results. Make a list of the similarities and differences in your work. Display your art. Discuss them in a group.

Imagine the range of emotions people must feel
during and after they experience a volcano.

Make a list of these emotions.

Visually express your ideas through drawing.

Use markers to draw faces that depict these emotions. Cut up newspaper and magazine faces to add to your drawing to help express your idea.



Critique the work of Winslow Homer and John Marin, two American painters.

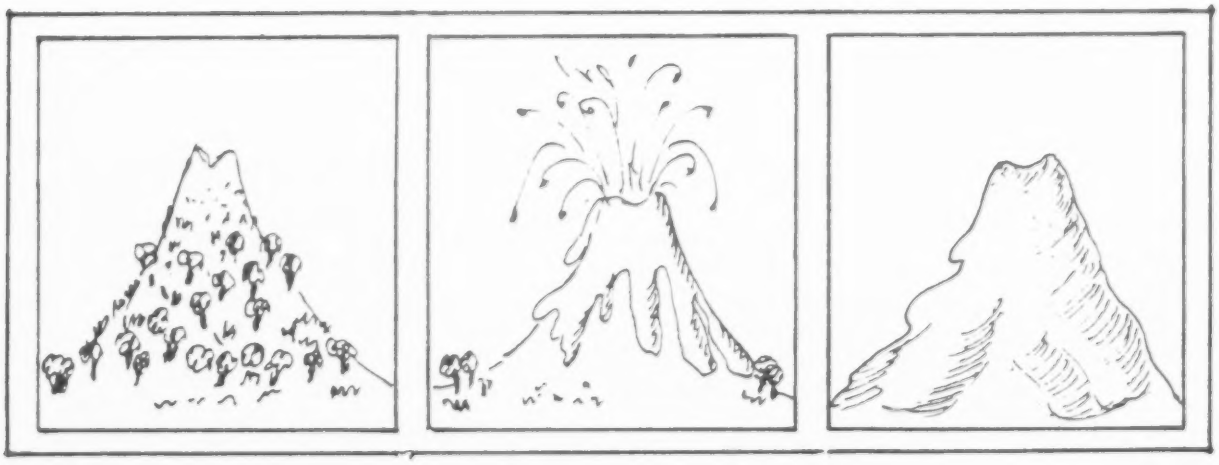
Both of these artists painted powerful, dynamic landscapes expressing the forces of Mother Nature.

"Northeaster" by Homer and **"Off New York Island, Maine"** by Marin are two very good examples.

Design a series of landscapes with tempera paint.

Each painting should represent a different stage of a volcano — before, during, and after an eruption. Make your painting as realistic as possible.

Mount and display your series together.



List 15 to 20 words that visually describe volcanic action.

Examples: massive dynamic overpowering

Determine if these visual qualities are in your work.